North Carolina Department of Health and Human Services
Employee Safety and Benefits

Safety and Health Program

Indoor Air Quality Survey
Number 04004

Lee Building
Caswell Center
Kinston, North Carolina

On Thursday, July 15, 2004, an indoor air quality survey was conducted of the Caswell Center's Lee Building in Kinston, North Carolina, at the request of Safety Director Barry Fulcher. The assessor was accompanied by Mr. Fulcher and HVAC Mechanic Colon Griffin.

Observations and Measurements

This is a three-story brick building resting on foundation, with sloped shingled roof. There was asphalt paving on the west and south sides and a portion of the north side, and grass-covered ground on the east side and the remaining portion of the north side. There was an exit to grade in the south wall of the first floor. An exit from the north side of the second floor opened onto a concrete passageway with exterior stairs to ground.

The complaint areas consisted of the second and third floors, which were comprised of a center section stretching north to south, intersected in the center by an east wing and a west wing. Each wing was comprised of a center hallway with offices, bathrooms, storerooms, and similar business occupancy rooms to each side. The center section hallway on the second floor opened to the building exterior through a properly marked exit at the north end, and terminated in a conference room on the south end. The second floor east wing hallway opened onto the center section hallway at its west end, and culminated in offices at it's east end. The second floor west wing hallway opened onto the center hallway at its east end, and culminated in a right angle turn to the north at its west end, which in turn culminated in an exterior building exit. The third floor was of almost identical design, except that there were no exits at the end of these hallways. Access from the third floor was by stairway located in the center section at the point of intersection with the wing hallways. Both floors were used for office activities consistent with the definition of business occupancy.

The second floor had three heating, ventilation, and air conditioning (HVAC) systems; one for the center section and one for each wing. The systems were interconnected at the junction of the wing hallways and the center hallways. There was outdoor air introduced into the system during each cycle: the amount was estimated at 20%.

The third floor had a single HVAC system serving the entire floor. There was outdoor air introduced into the system at each cycle: the amount was estimated at 20%.

The number of employees in each ventilation area was as follows:

Second Floor	
East Wing:	9
Center Section:	7
West Wing:	5
Third Floor	19

Prior to the assessment, employees had been asked by Caswell Center management to identify any symptoms they were experiencing while working in the building. A statistically relevant number of responses fell into two categories: allergic reactions and eye/nose/throat/respiratory irritation.

These symptoms could be as a result of the presence of high levels of micro-organisms, formaldehyde, nitrogen oxides, or ozone in the building. The assessor therefore focused the survey to determine if these conditions/substances did in fact exist in the building.

Temperature and relative humidity readings were taken throughout the building, using an Extech Instruments Humidity/Temperature Pen. These measurements compare to the ranges recommended by ASHRAE and OSHA as follows:

Category	**Recommended**	**Actual**		**Result**
Temperature (degrees Fahrenheit)	68° to 76°	East Wing	75.1°	Acceptable
		Center Section	77°	Above Range
		West Wing	75.5°	Acceptable
		3rd Floor	76°	Acceptable
Relative Humidity (percent)	20% to 60%	East Wing	45%	Acceptable
		Center Section	44%	Acceptable
		West Wing	49%	Acceptable
		3rd Floor	45%	Acceptable

Due to the age of the building, outdoor air was able to pass through windows and similar openings. Additionally, the ventilation systems were designed to introduce approximately 20% outdoor air into each cycle. Based on the above and the lack of other indicators, the assessor determined that the ventilation systems were consistent with ASHRAE and NIOSH recommendations.

The assessor the conducted a walkthrough of all four ventilation systems, to identify any existing conditions that could deteriorate the air quality.

> The exterior walls of the offices at the end of the hallway in the east wing were badly delaminated, and the moisture meter indicated moisture in these walls. The maintenance staff reported that several attempts had been made to repair the roof and to identify and repair the source of this moisture. There was no evidence of mold or other fungal infestation at these locations.
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> There were drains in the floors of several rooms, which appeared to have been bathrooms/shower rooms converted to office/storage room use. There was no evidence of sewer gases, fungal infestation, or other deteriorating conditions currently associated with these drains.
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> These was evidence of a past leak in the ceiling tiles at the north end of the central hallway on the third floor, and in the office to the east. Maintenance stated that a severe leak had developed in this location, but had been repaired. The ceiling was too high to test with the moisture meter, but a subsequent inspection of the attic space revealed no active leaks. There was no sign of fungal infestation at this location.
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> A dead bird and a moderate amount of bird droppings were found in the stairway leading from the third floor to the attic. This stairway was locked, and there was no overpowering odor in the area, suggesting the bird had been dead for quite awhile.

No other conditions were observed that would decrease the quality of the indoor air of the building, to identify any conditions which could contribute to the deterioration of the air quality.

Conclusions

> The assessor determined that there were no existing conditions in the Lee Building that corresponded to the complaints of the employees, and that the building – while old – was consistent with ASHRAE and NIOSH recommendations. A few minor conditions – listed above and addressed in the recommendations – were identified, but were not sufficient to

degrade the quality of the building's air to the extent necessary to pose a health risk to building employees.

Recommendations

1. Seal the floor drains in the second and third floor rooms that are not in bathrooms. Drains connect directly to storm and gray-water piping; when dry, fumes and gases can escape through them into the working environment.

2. Ensure that the leaks which caused the deterioration of the wall plaster have been isolated and repaired. Remove the dust and loose debris caused by delamination using wet methods and a HEPA equipped wet/dry vacuum cleaner. Repair the walls themselves when resources allow.

3. Replace ceiling tile that becomes discolored from water saturation. Cleaning of porous material such as ceiling tiles is not feasible.

4. Remove the dead bird and clean the bird droppings from the attic stairwell. Identify and seal any passages to the building exterior that would allow birds and other vermin to enter.

5. Rebalance the ventilation systems to maintain the temperature between 68 and 76° Fahrenheit, as recommended by ASHREA.

Respectfully submitted:

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